## PT report Number - PTC/MECH/TAPE/FR-001-1

| | |
|---|---|
| **PT Round Code** | **PTC/MECH/TAPE/001-1** |
| **Parameter, Range,** | **Instrumental error of Measuring Tape (0-5m) up to 1m.** |
| **Issue Date of Report** | 10/02/2022 |
| **Dates of Measurements** | 26/10/2021 to 03/02/2022 |
| **PT Coordinator(s)** | **Bhagyesh Udgirkar**<br>Cell. No.: +91-9099901824/ EMAIL: udgirkar@octagon.co.in;<br>**Vandana Deshmukh**<br>Cell. No.: +91-8329316210/ EMAIL: mr@octagon.co.in |

**Proficiency Test Item Description**

| | |
|---|---|
| **Clear description of the artifact, standards, items or materials used, including, where appropriate serial numbers and details of sample preparation and homogeneity or stability testing.** | **Calibration of Measuring Tape (Instrumental Error at different points up to 1m)**<br>Measuring Tape of 0-5 m L.C. -1.0 mm ID.No.-OMS-016<br><br>PT item was standard product used for this study. It is ensured that the measurements are taken by participants at identical positions of PT item and instructions are followed as per technical protocol like First align the Scale marking of tape parallel to cross hair, Use 50N force, if you measure it on Octagon's MSTC and for other machines, follow the instructions of manufacturer. Ensure that the tape is under sufficient tension. Align the camera /cross hair towards left side for measurement. Set '0' at 5mm and calibrate the tape at other points. Repeat the measurement five Times and report the average reading. |

**Homogeneity Assessment**

In this type of scheme (Sequential Participation Scheme), a single proficiency testing item (Artifact) is circulated successively from one participating laboratory to another, along with suitable Technical Protocol for calibrating the same. This type of PT scheme is used when the test item is non-destructive in nature, or test item is individually produced. The requirement for homogeneity does not apply in such a case.

**Stability Assessment**

A stability (Drift) assessment of PT item was analyzed with the help of two times calibrations performed at reference laboratory during the PT round. First Calibrations of PT Item was performed before start of the PT round, and then at the end of the PT round. The final stability study was conducted after completion of PT Round.

The stability of PT Item is used in uncertainty of reference value as given in equation no. 1 &2

| | |
|---|---|
| **Subcontracting Activities** | ❖ PT Item procurement<br>❖ Stability Testing<br>❖ Determination of Assigned Value from Reference Laboratory<br>❖ Transportation of PT items |
| **Details of the traceability and uncertainty of assigned values** | Assigned value is Traceable to National Standard through calibration of PT Items at NABL Accredited Calibration Laboratory.<br>Average of three calibration results from reference laboratory. |

## Conduct of Proficiency Test

| | |
|---|---|
| **Objectives** | The purpose of the scheme was to demonstrate proficiency in measurement of instrumental error of Measuring Tape up to 1m.<br>• To build up mutual confidence among the accredited laboratories providing calibration services with their customers.<br>• To support the labs for improving quality in calibration.<br>• To assist in finding the root cause of methodological problems, which can lead unsatisfactory performance of participating laboratories.<br>• To provide a tool for calibration labs to improve its quality performance in measurements. |
| **Summary of procedures used to design and implement the scheme (which may include reference to a scheme protocol)** | **The PT scheme was Quantitative & Sequential**<br>In the current case, measurand is a Dimension (Instrumental error) and proficiency test item is Measuring Tape up to 1m.<br>The PT item was circulated within 5 participants in Petal format. The labs were instructed to treat the PT item in the same way as routine laboratory samples. |
| **Measurement** | Measuring Tape of 5 m was measured for instrumental errors up to 1 m as recommended in |

| | |
|---|---|
| **Procedure Used** | **IS 1269 or NABL 129**. |
| **Confidentiality** | 1. All registered participants have been communicated their unique Laboratory Code number, which will be used for all further correspondence. The participant laboratory should use the allocated Laboratory code for all correspondence related to this PT Program PTC/MECH/TAPE/001-1.<br>2. Octagon is committed for maintaining confidentiality at all level, with this unique Laboratory Code which is known only to the concerned participants.<br>3. As per the signed contract the participating laboratory also agrees to maintain confidentiality and avoid falsification & collusion. |

## Performance Evaluation Criteria

| | |
|---|---|
| **Interpretation of the performance as per ISO 13528:2015** | Statistical method is used for Performance evaluation of participating laboratories is En score with average assigned values of reference laboratory and uncertainty of reference laboratory. |

## Analysis of PT results

**Summary of procedure used to establish any assigned value.**

**Summary of procedures used to statistically analyze the data.**

**Evaluation of performance with average Assigned Value of Reference Laboratory.**

The assigned value is determined by averaging the results of reference laboratory at different stages of PT round. En Score is evaluated by considering this assigned value with individual participant results. For evaluation of En score stability assessment factor is considered as one of the uncertainty component.

**Average Assigned Value**

$$x_{pt} = \frac{x_1 + x_2}{2} \quad (1)$$

**Uncertainty of reference laboratory**

$$U(x_{pt}) = \sqrt{(U)^2 + \left(\frac{a}{\sqrt{3}}\right)^2} \quad (2)$$

$$En = \frac{x_i - x_{pt}}{\sqrt{U^2(x_i) + U^2(x_{pt})}} \quad (3)$$

Where

$x_i$ – is the result of participant laboratory

$x_{pt}$ – is the Average Assigned value determined by reference laboratory

$U_{xi}$ – is the expanded uncertainty of the participants results $x_i$

$U_{xpt}$- is the expanded uncertainty of the assigned values $x_{pt}$

**Acceptance criteria for En Score:**

The calculated En-scores are tabulated in the report and their performance is assessed based on their En - Scores. The results of En-Score are interpreted as follows.

-1 <En < 1 = Successful performance

En ≤ -1 = Unsatisfactory indicate a need to review the uncertainty estimates, or to correct a measurement issue

En ≥ 1 = Unsatisfactory indicate a need to review the uncertainty estimates, or to correct a measurement issue

| | |
|---|---|
| **Laboratory test results (data)** | Participants were requested to perform the Measurements according to the Instructions mentioned in Technical Protocol and to submit their measurement results with uncertainty specified in the result sheet. The results of the individual laboratories were received through duly filled Result Sheet format by email and courier also.<br>See attached **tables 1** |
| **Assigned values and summary statistics for test methods/procedures used by other participants** | See attached **table 2** |
| **Tables of Data, precision tests, and evaluation data** | See attached **tables 3 to 6 (Summary of data)** |
| **Graphs of data, standard value/uncertainty values, misc. graphs** | See attached graphs. |
| **Copyright** | This report is the property of Octagon Measurement Solutions Pvt. Ltd., Pune and the contents given in this report shall not be reproduced in part or full by any organization or individual without written approval from Managing Director of Octagon Measurement Solutions Pvt. Ltd. |
| **Report Authorization** | Final PT report will be sent by Octagon to all participating labs in PDF format by E-mail. |

## Participant's Results

**Table 1: Measuring tape of 5m at different points up to 1m.**

**All participants asked to set the zero at ''5mm''.**

| S No | Lab. Code | Measurement Points (mm) | Measurement Result(mm) | Uncertainty of participant laboratory (mm) |
|---|---|---|---|---|
| 1 | MT001 | 150 | 150.0498 | 0.106 |
| | | 400 | 399.937 | 0.106 |
| | | 750 | 750.046 | 0.106 |
| | | 975 | 974.969 | 0.106 |
| 2 | MT002 | 150 | 150.089 | 0.1636 |
| | | 400 | 399.955 | 0.1636 |
| | | 750 | 749.917 | 0.1636 |
| | | 975 | 974.788 | 0.1636 |
| 3 | MT003 | 150 | 149.969 | 0.2888 |
| | | 400 | 399.799 | 0.2888 |
| | | 750 | 749.871 | 0.2888 |
| | | 975 | 974.833 | 0.2888 |
| 4 | MT004 | 150 | 149.987 | 0.289 |
| | | 400 | 399.949 | 0.290 |
| | | 750 | 749.905 | 0.290 |
| | | 975 | 974.876 | 0.291 |
| 5 | MT006 | 150 | 150.033 | 0.289 |
| | | 400 | 400.035 | 0.289 |
| | | 750 | 750.082 | 0.289 |
| | | 975 | 975.088 | 0.289 |

**Table 2: Average Assigned Values of Instrumental Error of measuring tape of 5m at different points up to 1m.**

**Reference laboratory set the zero at ''5mm''**

| Sl. No. | Instrumental Errors at points in mm | X1 (mm) (26.10.2021) | X2 (mm) 03.02.2022 | Average Assigned Value( Xpt ) (mm) | a =X max- X min (mm) | U xpt (mm) |
|---|---|---|---|---|---|---|
| **1.** | 150 | 149.962 | 149.925 | 149.9435 | 0.021 | 0.0828 |
| **2.** | 400 | 399.884 | 399.837 | 399.8605 | 0.027 | 0.0845 |
| **3.** | 750 | 749.747 | 749.736 | 749.7415 | 0.006 | 0.0803 |
| **4.** | 975 | 974.847 | 974.837 | 974.8420 | 0.006 | 0.0802 |

**NABL Accredation No.:PC-1057**

**PT report Number - PTC/MECH/TAPE/FR-001-1**

## Summary of performance [data tables]

**En Score with Average assigned value from Reference Laboratory**

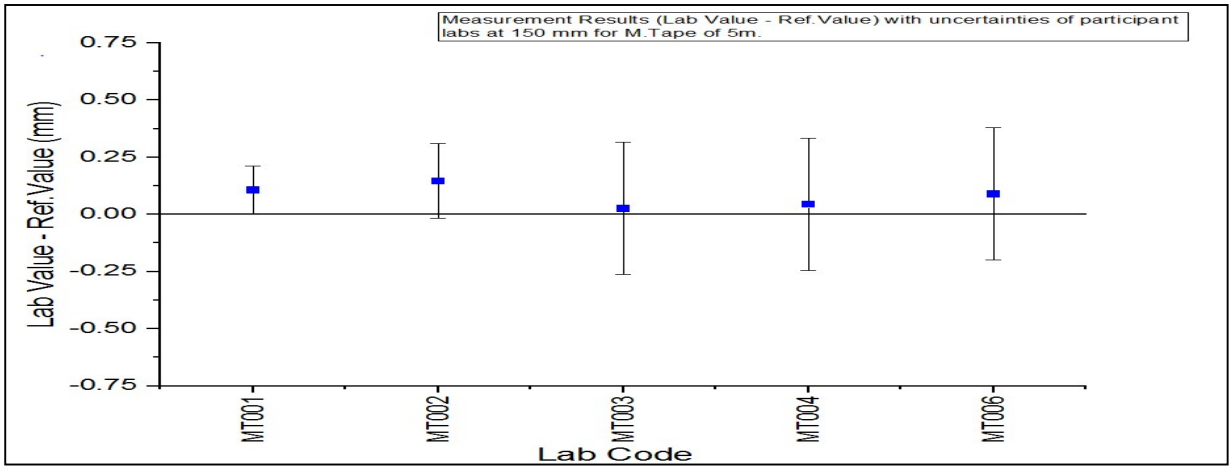
**Table 3: En score for Measuring tape of 5m at 150mm**

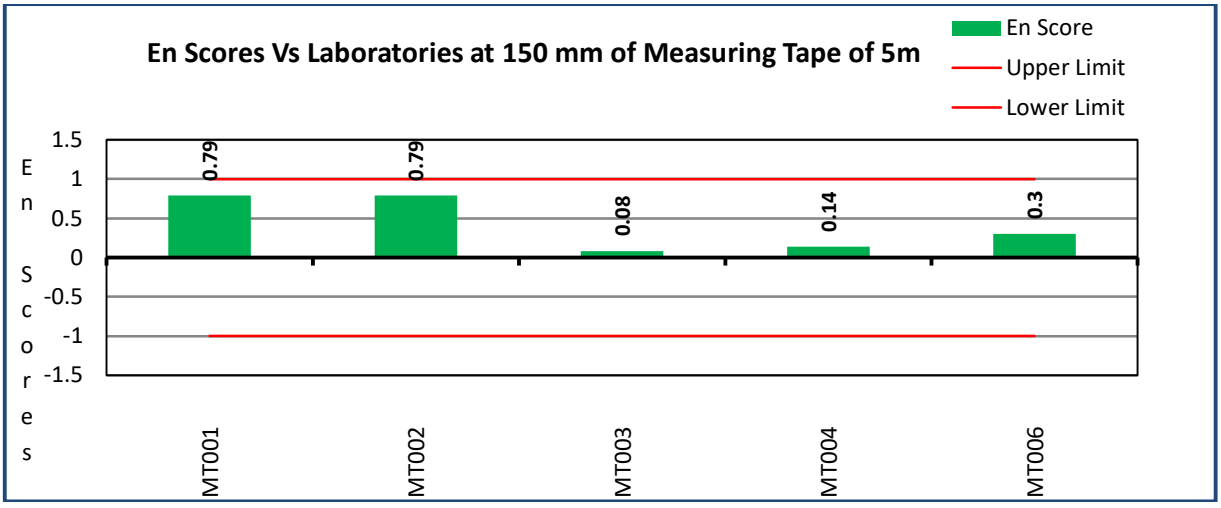
**Assigned Value (Xpt) = 149.9435 mm**

**Uncertainty of Assigned Value U(xpt) = 0.0828 mm**

**S- Satisfactory & U- Unsatisfactory**

| Lab. Code | Measurement Result (mm) | Uncertainty of participant laboratory (mm) | En Score | Performance S/U |
|---|---|---|---|---|
| **MT001** | 150.0498 | 0.106 | 0.79 | **S** |
| **MT002** | 150.089 | 0.1636 | 0.79 | **S** |
| **MT003** | 149.969 | 0.2888 | 0.08 | **S** |
| **MT004** | 149.987 | 0.289 | 0.14 | **S** |
| **MT006** | 150.033 | 0.289 | 0.30 | **S** |



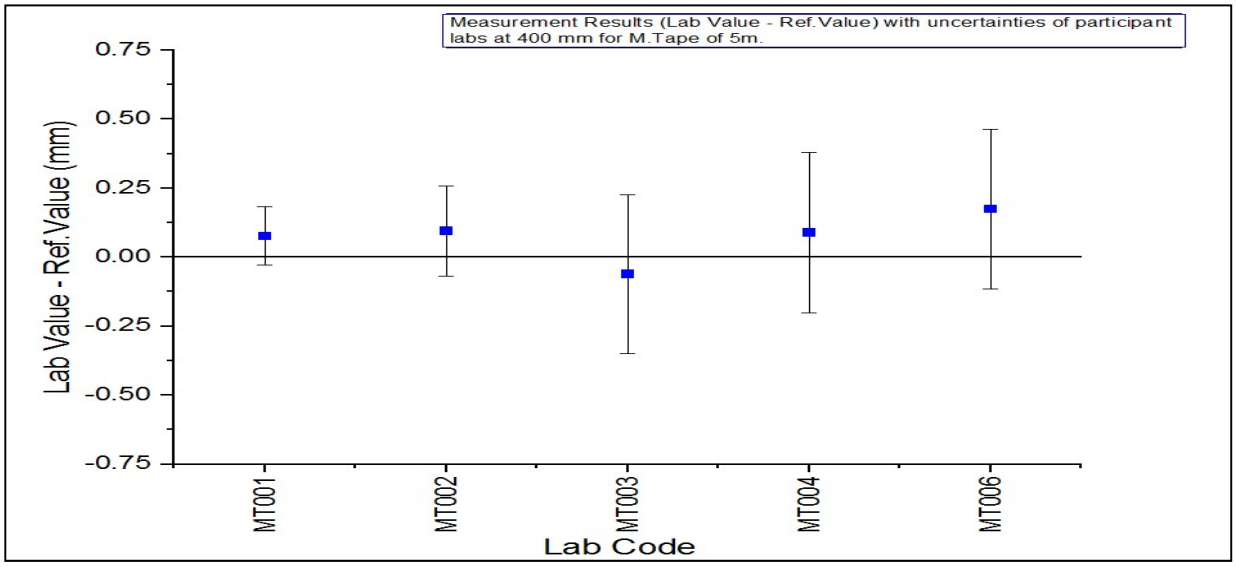



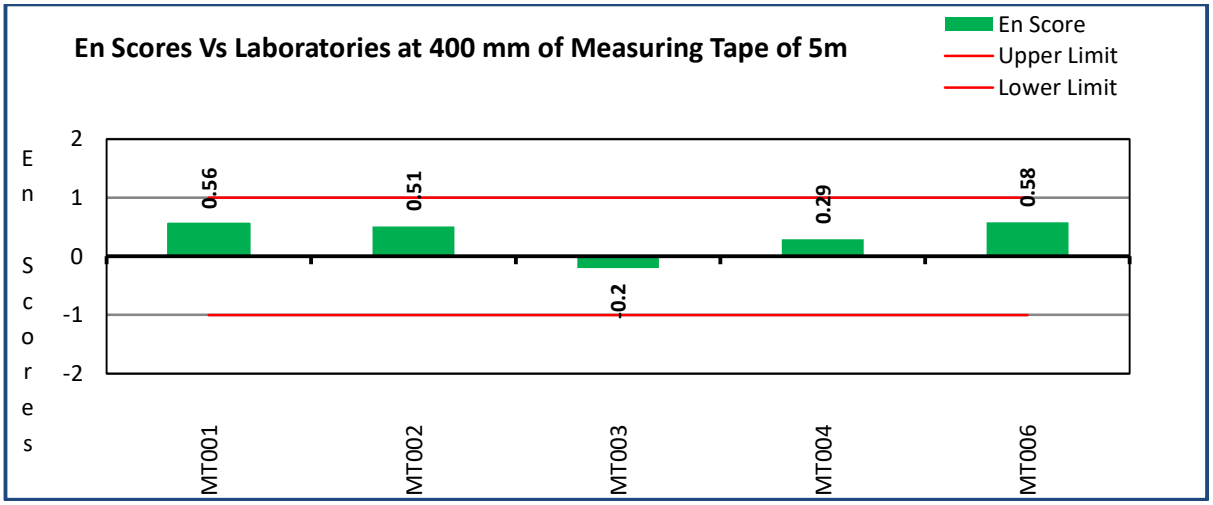
PT report Number - PTC/MECH/TAPE/FR-001-1

**Table 4: En score for Measuring tape of 5m at 400mm**
**Assigned Value (Xpt) = 399.8605 mm**
**Uncertainty of Assigned Value U(xpt) = 0.0845 mm**

S- Satisfactory & U- Unsatisfactory

| Lab. Code | Measurement Result (mm) | Uncertainty of participant laboratory (mm) | En Score | Performance S/U |
|---|---|---|---|---|
| MT001 | 399.937 | 0.106 | 0.56 | S |
| MT002 | 399.955 | 0.1636 | 0.51 | S |
| MT003 | 399.799 | 0.2888 | -0.20 | S |
| MT004 | 399.949 | 0.290 | 0.29 | S |
| MT006 | 400.035 | 0.289 | 0.58 | S |



PT report Number - PTC/MECH/TAPE/FR-001-1

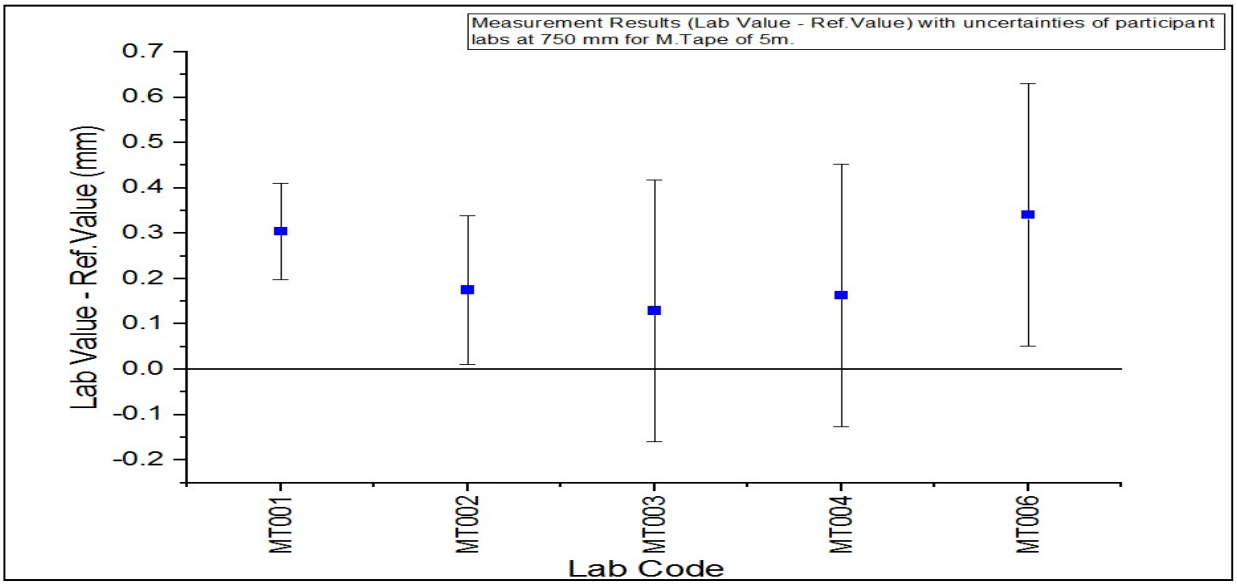
**Table 5: En score for Measuring tape of 5m at 750mm**

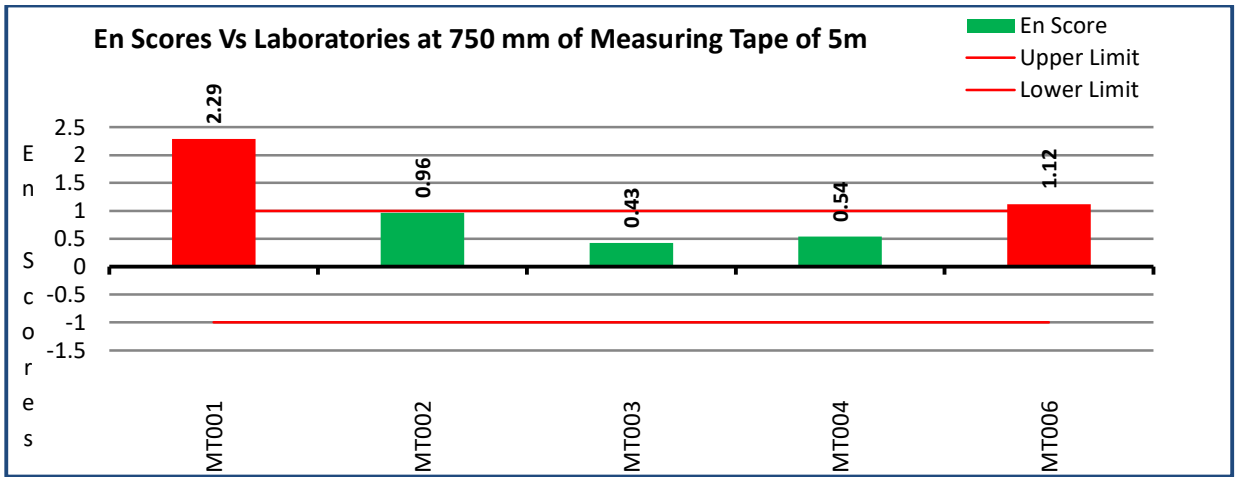
**Assigned Value (Xpt) = 749.7415 mm**

**Uncertainty of Assigned Value U(xpt) = 0.0803 mm**

S- Satisfactory & U- Unsatisfactory

| Lab. Code | Measurement Result (mm) | Uncertainty of participant laboratory (mm) | En Score | Performance S/U |
|---|---|---|---|---|
| MT001 | 750.046 | 0.106 | 2.29 | U |
| MT002 | 749.917 | 0.1636 | 0.96 | S |
| MT003 | 749.871 | 0.2888 | 0.43 | S |
| MT004 | 749.905 | 0.290 | 0.54 | S |
| MT006 | 750.082 | 0.289 | 1.12 | U |



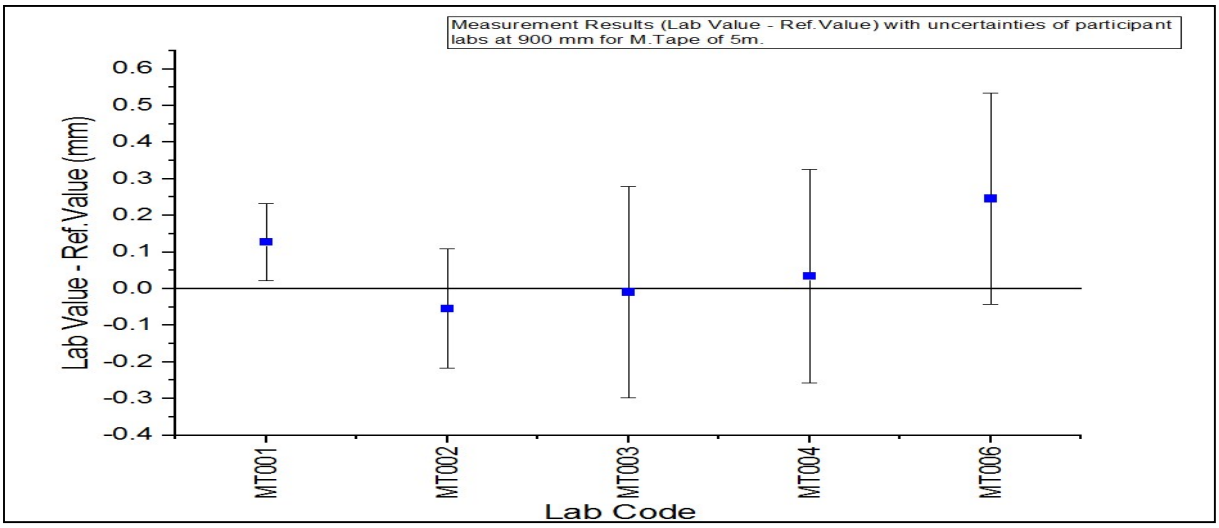



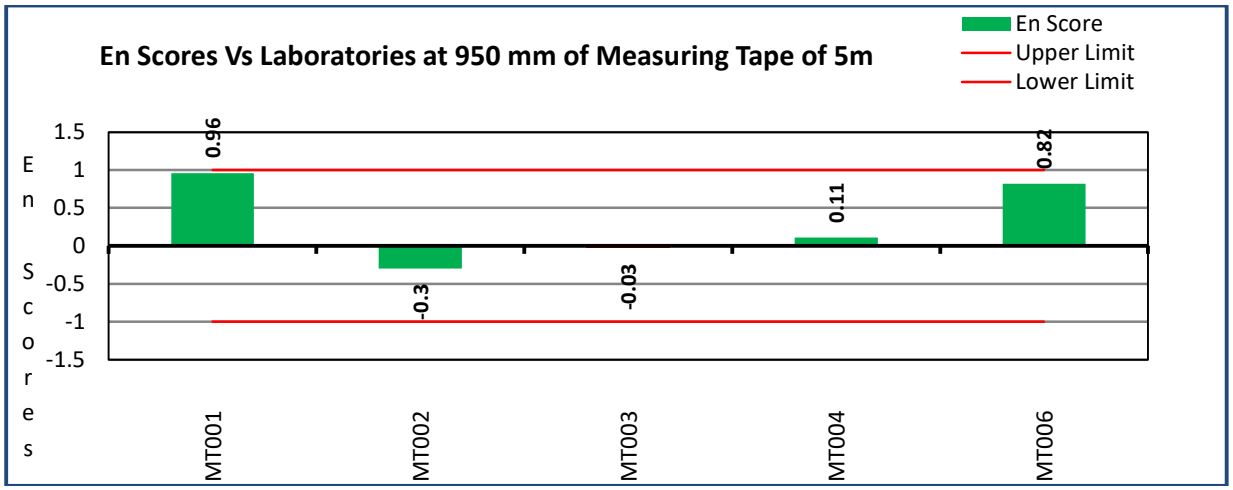
PT report Number - PTC/MECH/TAPE/FR-001-1

**Table 6: En score for Measuring tape of 5m at 975mm**
**Assigned Value (Xpt) = 974.842 mm**
**Uncertainty of Assigned Value U(xpt) = 0.0802 mm**

S- Satisfactory & U- Unsatisfactory

| Lab. Code | Measurement Result (mm) | Uncertainty of participant laboratory (mm) with K=2 | En Score | Performance S/U |
|---|---|---|---|---|
| MT001 | 974.969 | 0.106 | 0.96 | S |
| MT002 | 974.788 | 0.1636 | -0.30 | S |
| MT003 | 974.833 | 0.2888 | -0.03 | S |
| MT004 | 974.876 | 0.291 | 0.11 | S |
| MT006 | 975.088 | 0.289 | 0.82 | S |



# Proficiency Test Final Report

**Issued By**

## Octagon Measurement Solutions Pvt. Ltd.

**PT Division**

**NABL Accredation No.:PC-1057**

**PT report Number - PTC/MECH/TAPE/FR-001-1**

| **Conclusions - Comments on participants' performance by the provider and technical advisers** |
|---|

In this proficiency testing program five laboratories have participated for this comparison of instrumental error up to 1 m of measuring tape of 5 m.
Table 3 to 6 and graphs shows the tabular and graphical summary of measurement results, Uncertainties of Measurement and En scores.

**Statistical Analysis for Evaluation of performance of participant laboratories:**

En score for each participant is evaluated based on Reference value given by reference laboratory (Assigned value as average of three times measurement values) and uncertainty of reference lab as per Tables 2. An En lying between –1 and +1 indicates an acceptable degree of comparison between Participant's result and the reference values when the quoted uncertainties are considered for satisfactory competence.

In the present comparison, it was observed that out of 5 participating laboratories that three (3) participating labs with lab code numbers MT002, MT003 & MT004 are showing En ≤ ±1 and their performance is satisfactory for all parameters.

Two participating labs with lab code numbers MT001 & MT 006 are showing En> ±1 for one parameter, needs to do thorough analysis for uncertainty estimates or correct method/ procedure used for measurements and take corrective actions accordingly.

This report will provide evidence to the lab to maintain the quality assurance in terms of satisfactory participation in proficiency testing as per calibration requirement in the ISO/IEC17025:2017.

The PT report has been completed for instrumental errors for measuring tape for different measurement points and is submitted to NABL.

| | |
|---|---|
| **Advice, where appropriate, on the interpretation of the statistical analysis** | -- |

**Prepared By**

Bhagyesh Vasantrao Udgirkar
Digitally signed by Bhagyesh Vasantrao Udgirkar
Date: 2022.02.11 17:39:03 +05'30'

**Technical Manager**

Octagon Measurement Solutions Pvt. Ltd.

**Authorized By**

Vandana Girish Deshmukh
Digitally signed by Vandana Girish Deshmukh
Date: 2022.02.11 17:40:15 +05'30'

**Quality Manager**

**----------End of Report----------**

**Disclaimer:** Octagon does not accept any liability whatsoever as to the application or use of information contained herein. This report in part/full shall not be used for any misleading claim.